

Walter, B.

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SOLAR OBSERVATIONS

SOLAR RADIATION OBSERVATIONS DURING MAY 1936

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1935 REVIEW, page 24.

Table 1 shows that solar radiation intensities averaged above normal at Washington and Madison, and below normal at Lincoln. No water-vapor clouds were detected on May 15 at Lincoln when the exceedingly low radiation values were obtained. White haze was reported at the station when readings were made; and W. J. Bryan of the university station reports that notes from cooperative observers near Lincoln indicate severe local dust storms, chiefly at high elevation. Several other dust-storms were reported near Lincoln during the month, with resulting effects on the solar radiation receipt, as shown in table 1.

Table 2 shows a very marked excess in the amount of total solar and sky radiation at all stations, with the exception of Fairbanks, Twin Falls, Miami, Blue Hill, Friday Harbor, and Ithaca.

Polarization observations obtained at Washington on 5 days give a mean of 61 percent, with a maximum of 63 percent on the 28th. At Madison, observations made on 7 days give a mean of 60 percent, with a maximum of 67 percent on the 27th. All of these values are slightly higher than the corresponding May normals.

TABLE 1.—Solar radiation intensities during May, 1936

[Gram-calories per minute per square centimeter of normal surface]

WASHINGTON, D. C.

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
May 1	mm 10.59	cal. 0.58	cal. 0.67	cal. 0.82	cal. 0.96	cal. 1.39	cal. 0.94	cal.	cal.	cal.	mm 10.21	
May 5	6.27					1.43					5.79	
May 6	6.27	.57	.71	.86	1.09	1.39					6.27	
May 14	4.95	.81	.93	1.05	1.22	1.45	1.12				4.97	
May 15	7.04	.60	.75	.94	1.09	1.42	1.22				4.75	
May 20	5.56	.78	.89	1.05	1.22	1.42	1.18				4.75	
May 22	8.18						.98				5.36	
May 23	8.18				1.16	1.36					7.29	
May 28	5.33	.56	.72	.97	1.32	1.14					4.57	
May 29	4.95				1.23	1.42					4.75	
Means		.65	.78	.95	1.16	1.41	1.09					
Departures		+.02	+.06	+.12	+.16	+.14	+.16					

TABLE 1.—Solar radiation intensities during May, 1936—Contd.

MADISON, WIS.

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
May 5	mm 7.87	cal.	cal.	cal. 0.72	cal. 0.89	cal.	cal.	cal.	cal.	cal.	mm 9.83	
May 8	10.97				.99						12.24	
May 13	6.50					1.52					5.56	
May 14	4.75		0.89	1.01	1.20	1.39					5.56	
May 19	8.18		.59	.76	1.16	1.51					6.76	
May 21	7.04		.77	.88							6.27	
May 25	8.48					1.36					7.87	
May 26	10.21			.92	1.12						10.97	
May 27	11.38				1.27	1.49					8.48	
May 28	5.36		.77	.91	1.10	1.54					7.04	
May 29	6.50		1.04	1.14	1.27	1.49					6.50	
Means			.81	.91	1.12	1.47						
Departures			-.01	.00	+.01	+.10						

LINCOLN, NEBR.

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
May 4	9.83					1.36	1.06	0.88	0.70	0.50	10.59	
May 12	10.97					1.36	1.20	1.00	.86	.73	11.38	
May 13	6.76		.86	1.02	1.19	1.43					5.16	
May 14	7.04							.92	.78	.67	6.27	
May 15	9.47		.24	.36	.59		1.11	.90	.77	.63	12.24	
May 16	13.13				.61	1.20					12.24	
May 18	7.29							1.04	.89	.78	6.76	
May 19	7.87		.87	1.01	1.22	1.39	1.10	.93	.79	.66	7.87	
May 26	11.81		.95	1.12	1.26	1.42					12.24	
May 27	9.83			.98	1.14	1.42					11.38	
May 28	8.81				1.24	1.45					8.18	
Means			.73	.90	1.04	1.38	1.12	.94	.80	.66		
Departures			-.05	-.03	-.07	+.00	+.02	+.04	-.01	-.02		

BLUE HILL, MASS. (HARVARD UNIVERSITY)

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
May 1	10.7					0.71	1.10				12.3	
May 2	10.7					1.14	1.50	1.08	.74		11.9	
May 5	6.5					1.34	1.46				2.9	
May 6	5.6				1.23	1.18					6.5	
May 7	8.8					.96	1.08		.95		7.4	
May 8	10.5				.71	.77	1.18				11.9	
May 9	11.5					.76	1.12	.99			7.4	
May 10	6.5					.76	1.25	.91			11.5	
May 11	8.6					.84	1.16	.75			11.9	
May 14	6.5					1.45	1.45	1.18			4.6	
May 15	5.6	1.04	1.11	1.21	1.35	1.60					3.8	
May 16	2.3				1.34	1.50	1.34	1.21	1.15	1.09	3.0	
May 17	6.5				1.34	1.25	1.04				9.6	
May 18	13.2				.83	1.20					9.6	
May 19	13.2				1.17	1.07					14.3	
May 20	5.0				1.17	1.47	1.21				4.8	
May 21	5.6				1.21	1.43	1.47	1.02			3.8	
May 22	4.4				1.15	1.24	1.48	1.02			3.3	
May 23	7.4				1.01	1.28					13.3	
May 24	12.8				.75	1.15					8.6	
May 25	9.2				1.28	1.38					8.6	
May 26	6.5				1.10	1.37	1.06				8.2	
May 27	9.9							.85	.75	.66	11.1	
May 28	6.8				1.04	1.18					6.5	
May 29	6.3				.86	1.39					6.8	
May 30	7.6				.88	1.44					6.8	
May 31	6.5				1.25	1.45					6.3	
Means		1.04	1.11	1.09	1.05	1.31	1.05	.93	.95	.88		

TABLE 2.—Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface

Week beginning—	Gram-calories per square centimeter																		
	Washing- ton	Madison	Lincoln	Chicago	New York	Fresno	Pitts- burgh	Fair- banks	Twin Falls	La Jolla	Miami	New Orleans	River- side	Blue Hill	Mount Wash- ington	Friday Harbor	Ithaca	San Juan	
1936	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Apr. 29.....	559	350	493	323	412	686	393	391	416	616	520	609	559	425	cal.	712	345	485	
May 6.....	544	473	330	458	528	709	566	459	640	630	555	486	627	506	-----	563	534	389	
May 13.....	548	593	647	615	538	749	580	434	613	666	424	360	588	571	-----	533	359	413	
May 20.....	650	507	521	501	683	739	656	476	634	461	450	341	555	702	-----	550	430	411	
May 27.....	661	546	686	592	563	629	556	345	471	685	393	567	540	546	-----	210	302	556	
Departures from weekly normals																			
Apr. 29.....	+103	-88	+18	-48	+23	+60	-----	-10	-97	-----	-5	+228	-	-61	-----	+163	-53	-----	
May 6.....	+97	+29	-114	+75	+139	+67	-----	+42	+50	-----	+21	+104	+75	+0	-----	+13	+83	-----	
May 13.....	+77	+111	+124	+82	+118	+82	-----	-10	-10	-----	-66	-5	+28	+23	-----	+17	-148	-----	
May 20.....	+143	+15	-36	+143	+237	+63	-----	+34	-10	-----	-47	-46	-13	+128	-----	+81	-57	-----	
May 27.....	+137	+49	+166	+131	+202	-47	-----	-57	-109	-----	-79	+73	-20	+26	-----	-290	-134	-----	
Accumulated departures on June 2																			
	+1,764	+1,484	+819	+4,851	+4,984	+3,339	-----	+35	+336	-----	-2,821	+6,825	-343	-42	-----	+793	-2,629	-----	

TABLE 3.—Total, I_m and screened, I_v , I_r , solar radiation intensity measurements, obtained during May 1936 and determinations of the atmospheric turbidity factor, β , and water-vapor content, w =depth in millimeters, if precipitated

AMERICAN UNIVERSITY, WASHINGTON, D. C.

Date and hour angle, 1936	Solar altitude	Air mass	I_m	I_v	I_r	β_{I_m-r}	β_{I_v-r}	β_{m-sun}	$\frac{I_{v-0}}{1.94}$	$\frac{I_{v-0}-I_m}{1.94}$	w	Air-mass type
									Percentage of solar constant			
May 1												
1:28 p. m.-----	59 21	1.16	1.311	0.928	0.719	0.068	0.020	0.044	83.6	15.2	50.0	Ta.
1:32 p. m.-----	58 47	1.17	1.308	.926	.713	.068	.020	.044	83.6	15.4	50.0	
May 14												
1:12 p. m.-----	64 29	1.11	1.432	.958	.753	.037	.028	.032	85.2	10.1	12.0	Pc.
1:16 p. m.-----	63 27	1.12	1.427	.956	.750	.037	.027	.032	85.2	10.3	12.1	
May 15												
0:36 a. m.-----	68 34	1.07	1.338	.943	.743	.110	.050	.080	79.2	9.0	11.6	Nrc.
0:32 a. m.-----	68 52	1.07	1.339	.944	.744	.110	.050	.080	79.2	8.9	11.7	
May 20												
1:20 a. m.-----	64 27	1.11	1.357	.958	.747	.086	.022	.054	82.8	10.4	16.0	Pc.
1:16 a. m.-----	65 01	1.10	1.360	.958	.747	.085	.021	.053	82.8	10.4	15.8	
May 28												
2:52 a. m.-----	49 27	1.31	1.418	.943	.751	.034	.040	.037	82.9	8.1	6.1	Pc.
2:44 a. m.-----	50 09	1.30	1.419	.943	.751	.036	.040	.038	82.9	8.1	6.4	

ATMOSPHERIC CONDITIONS DURING TURBIDITY MEASUREMENTS

May 1. Temperature 20° C., wind, SE 10; visibility, 30 miles; blueness of sky, 4; polarisation, 59.8 percent.
 May 14. Temperature 10° C., wind, NW, 18; visibility, 30 miles; blueness of sky, 6; polarisation, 61.6 percent.
 May 15. Temperature 9° C., wind, SE, 8; visibility, 30 miles; blueness of sky, 5; polarisation, 60.7 percent.
 May 20. Temperature 12° C., wind, NW, 16; visibility, 30 miles; blueness of sky, 5; polarisation, 60.5 percent.
 May 28. Temperature 11° C., wind, NW, 20; visibility, 50 miles; blueness of sky, 6; polarisation, 62.9 percent.

BLUE HILL METEOROLOGICAL OBSERVATORY OF HARVARD UNIVERSITY

Date and hour angle, 1936	Solar altitude	Air mass	I_m	I_v	I_r	β_{I_m-r}	β_{I_v-r}	β_{m-sun}	$\frac{I_{v-0}}{1.94}$	$\frac{I_{v-0}-I_m}{1.94}$	w	Air-mass type
									Percentage of solar constant			
May 1												
8:12 a. m.-----	40 42	1.53	0.879	0.619	0.515	0.204	0.208	0.206	56.3	10.3	6.1	Ta.
May 2												
2:59 a. m.-----	43 31	1.45	1.283	.829	.644	.033	.050	.042	86.0	13.8	11.3	Ta, S aloft.
4:04 p. m.-----	24 16	2.43	.990	.699	.550	.060	.062	.061	67.8	15.4	9.6	
May 5												
2:47 a. m.-----	44 53	1.41	1.236	.812	.651	.076	.107	.092	73.4	8.6	6.9	Nrc.
1:40 a. m.-----	55 43	1.21	1.400	.919	.720	.022	.043	.032	85.0	10.5	9.4	
May 6												
3:16 a. m.-----	41 00	1.52	1.085	.762	.608	.123	.108	.116	68.6	11.8	9.4	Nrc.
0:32 a. m.-----	63 05	1.12	1.159	.798	.631	.149	.145	.147	71.1	10.5	9.7	

TABLE 3.—Total, I_m and screened, I_s , I_r , solar radiation intensity measurements, obtained during May 1936 and determinations of the atmospheric turbidity factor, β , and water-vapor content, w =depth in millimeters, if precipitated—Continued

BLUE HILL METEOROLOGICAL OBSERVATORY OF HARVARD UNIVERSITY—Continued

Date and hour angle, 1936	Solar altitude		Air mass	I_m	I_s	I_r	β_{I_m-r}	β_{I_s-r}	$\beta_{m=0.0}$	$\frac{I_{w=0}}{1.94}$ $\frac{I_{w=0}-I_m}{1.94}$		w	Air-mass type
	°	'								m	gr. cal.		
May 7													
3:48 p. m.	35	24	1.72	1.024	0.720	0.569	0.110	0.112	0.111	66.5	12.7	9.1	N _{re} →T _e .
4:36 p. m.	26	34	2.23	.846	.605	.501	.120	.143	.132	58.8	12.4	8.1	
May 8													
4:08 a. m.	31	55	1.89	.818	.565	.446	.112	.130	.121	61.2	18.2	13.0	T _e .
2:17 a. m.	51	25	1.28	1.065	.707	.561	.118	.128	.123	71.3	15.3	13.3	
0:08 a. m.	64	43	1.10	1.131	.727	.584	.128	.137	.132	74.5	15.1	14.1	
3:50 p. m.	34	29	1.77	.872	.615	.496	.160	.150	.155	65.0	19.4	14.4	
May 9													
2:32 a. m.	49	10	1.32	1.081	.720	.561	.110	.117	.114	71.8	15.0	12.8	T _e .
1:40 p. m.	56	37	1.19	1.203	.802	.632	.096	.107	.102	72.9	9.7	8.6	
May 10													
2:54 p. m.	45	26	1.40	1.142	.755	.618	.102	.106	.102	71.0	11.0	9.1	P _e .
4:16 p. m.	30	47	1.95	.923	.683	.537	.128	.106	.116	62.6	14.1	9.8	
May 11													
3:12 a. m.	42	38	1.48	.992	.678	.566	.103	.225	.194	59.5	7.3	7.0	N _{re} →T _e .
1:02 a. m.	62	15	1.27	1.092	.741	.613	.157	.201	.179	63.4	6.0	5.0	
0:43 p. m.	64	36	1.23	1.086	.725	.606	.143	.250	.196	63.4	7.7	6.7	
3:25 p. m.	40	16	1.54	.929	.645	.537	.142	.175	.168	53.3	4.4	3.3	
0:31 a. m.	65	27	1.10	1.412	.902	.735	.044	.064	.044	81.0	6.6	6.0	
May 14													
3:39 p. m.	38	14	1.61	1.260	.854	.681	.058	.064	.058	78.3	10.2	7.8	N _{re} , T _e aloft.
May 15													
4:29 a. m.	29	07	2.06	1.337	.894	.734	.024	.062	.043	71.4	3.9	2.5	N _{re} .
3:03 a. m.	44	51	1.41	1.452	.942	.766	.018	.080	.049	81.8	5.3	4.3	
0:16 a. m.	66	18	1.09	1.473	.933	.778	.036	.138	.087	81.7	4.1	3.6	
May 16													
2:38 a. m.	49	24	1.31	1.428	.934	.757	.030	.079	.054	80.4	5.1	4.2	P _e .
0:15 a. m.	66	35	1.09	1.501	.946	.776	.018	.096	.057	82.4	3.2	2.8	
5:03 p. m.	23	06	2.54	1.299	.851	.701	.001	.057	.029	74.9	6.4	3.8	
May 18													
4:04 a. m.	34	14	1.78	.902	.616	.505	.136	.158	.147	64.4	16.8	15.1	T _m , S aloft.
1:12 a. m.	62	38	1.12	1.157	.779	.611	.127	.115	.121	75.2	13.4	12.4	
May 19													
1:48 a. m.	56	57	1.09	1.031	.688	.573	.052	.100	.076	72.6	6.0	3.7	N _{re} .
3:49 a. m.	37	08	1.65	1.251	.828	.678	.052	.100	.076	72.6	6.0	3.7	
1:23 a. m.	61	22	1.14	1.429	.933	.752	.012	.088	.065	80.8	5.4	4.7	
3:28 p. m.	40	58	1.52	1.304	.898	.690	.043	.006	.025	83.4	14.6	11.6	
May 21													
3:14 a. m.	43	27	1.45	1.271	.857	.705	.078	.122	.100	71.8	1.7	1.2	P _e .
2:43 a. m.	49	05	1.32	1.336	.859	.730	.045	.075	.060	79.4	8.6	7.2	
0:10 p. m.	67	51	1.08	1.409	.922	.739	.050	.081	.066	81.9	7.5	6.9	
May 22													
3:28 a. m.	41	21	1.51	1.222	.824	.680	.084	.130	.107	76.3	11.7	9.3	P _e .
2:23 a. m.	61	48	1.13	1.340	.903	.724	.044	.052	.048	83.3	12.5	11.2	
0:05 p. m.	67	21	1.09	1.363	.905	.733	.079	.120	.100	77.0	5.0	4.5	
2:33 p. m.	51	13	1.28	1.259	.818	.662	.086	.111	.098	74.3	8.0	6.8	
May 23													
2:01 a. m.	56	37	1.19	1.247	.712	.565	.155	.150	.152	78.0	11.5	10.3	N _{re} , T _m aloft.
May 24													
5:00 a. m.	24	38	2.39	.814	.580	.492	.117	.178	.148	54.7	11.7	7.4	N _{re} →T _m .
3:42 a. m.	39	03	1.69	1.032	.699	.580	.119	.183	.151	61.4	6.8	5.2	
May 25													
2:40 a. m.	50	20	1.29	1.309	.837	.672	.046	.100	.073	77.7	8.5	7.2	N _{re} , S aloft.
1:39 a. m.	60	14	1.15	1.352	.884	.684	.039	.027	.033	85.5	14.0	12.8	
May 26													
4:25 a. m.	30	00	2.00	1.073	.714	.573	.058	.093	.076	68.8	10.8	7.5	N _{re} .
3:54 a. m.	37	04	1.65	1.244	.819	.661	.046	.087	.066	74.5	8.7	6.6	
2:47 a. m.	49	13	1.32	1.307	.854	.683	.050	.083	.066	78.4	9.2	7.7	
4:36 p. m.	29	18	2.04	1.053	.722	.589	.073	.104	.088	66.1	10.4	7.1	
5:39 p. m.	17	53	3.23	.821	.592	.508	.091	.138	.114	50.9	7.4	3.9	
May 28													
4:14 a. m.	32	38	1.86	1.198	.849	.663	.059	.058	.058	71.9	8.4	6.0	P _e .
May 29													
4:15 a. m.	34	04	1.78	1.177	.806	.660	.073	.100	.086	70.2	7.8	5.6	P _e .
2:50 a. m.	49	01	1.32	1.347	.885	.725	.057	.119	.088	75.3	4.0	3.2	
0:09 a. m.	69	16	1.07	1.426	.912	.743	.046	.080	.063	82.0	6.4	5.9	
May 30													
4:30 a. m.	30	48	1.95	1.065	.737	.616	.096	.109	.102	64.8	8.4	5.7	P _e .
2:25 a. m.	33	28	1.25	1.264	.858	.700	.100	.138	.119	71.7	4.7	3.9	
May 31													
5:25 a. m.	20	47	2.80	.798	.555	.455	.084	.086	.084	62.0	19.7	11.6	P _e .
4:35 a. m.	29	57	2.00	1.252	.829	.664	.040	.086	.063	71.4	5.0	3.3	
3:22 a. m.	43	24	1.45	1.343	.874	.712	.037	.093	.065	73.8	2.6	1.8	
1:29 a. m.	62	27	1.13	1.414	.914	.727	.033	.065	.049	82.7	7.8	7.1	
0:07 p. m.	69	36	1.06	1.445	.929	.748	.035	.092	.064	80.9	4.3	3.9	

Atmospheric conditions during solar radiation measurements, Blue Hill Observatory of Harvard University, May 1936

Date and time from apparent noon	Air temperature	Wind, Beaufort scale	Visibility (scale 0-10)	Sky blue-ness	Cloudiness and remarks
1: 2:57 a. m. ---	+22.5	SE 1. ---	7	2	Zero clouds. mod. haze.
6: 3:57 a. m. ---	+10.6	N 2. ---	7	8	Few Ci; 1 Acu.
8: 4:04 a. m. ---	+16.1	W 3. ---	7	8	Few Ci; few Cu; light haze.
8: 3:31 p. m. ---	+28.4	S 3. ---	8	6	3 Ciu; mod. haze.
8: 2:20 a. m. ---	+23.06	NNW 2. ---	6	7	3 Ci; mod. haze.
10: 3:58 p. m. ---	+10.3	NE 2. ---	8	6	1 Stcu.
11: 3:01 a. m. ---	+15.0	SSW 3. ---	7	8	Zero clouds; mod. haze.
11: 0:30 p. m. ---	+23.4	S 3. ---	7	8	Zero clouds; mod. haze.
15: 3:31 a. m. ---	+13.61	SSW 3. ---	9	8	Few Ci; light haze.
15: 0:13 a. m. ---	+16.9	SW 4. ---	9	10	Few Cl.
16: 2:52 a. m. ---	+2.5	NW 4. ---	10	8	Few Ci; few Cu.
16: 0:30 a. m. ---	+5.6	NW 4. ---	10	10	Few Ci; few Cu; wind gusty.
20: 1:47 a. m. ---	+10.6	NW 5. ---	8	8	Few Cu; light haze.
20: 3:13 p. m. ---	+13.9	NW 5. ---	9	8	Few Cu.
21: 3:08 a. m. ---	+10.1	NW 3. ---	8	8	1 Cu; light haze.
22: 2:02 a. m. ---	+10.0	NE 3. ---	9	8	1 Ci.
22: 0:11 p. m. ---	+12.2	N 3. ---	9	8	1 Ci.
23: 2:55 a. m. ---	+20.9	SW 3. ---	7	8	3 Ci; light haze.
24: 3:58 a. m. ---	+23.1	W 4. ---	7	7	6 Ci; light haze.
26: 3:04 p. m. ---	+14.9	NNW 3. ---	9	8	Few Ci; 1 Acu; few Cu, Frcu; light haze.
27: 5:51 p. m. ---	+18.9	SE 2. ---	7	9	3 Acu, Stcu; 4 Cunb, Cu cong.
28: 4:10 a. m. ---	+11.5	WNW 5. ---	9	8	Few Acu; 4 Cu; light haze.
29: 4:21 a. m. ---	+8.9	NW 3. ---	9	8	Few Acu.
30: 4:28 a. m. ---	+12.2	W 1. ---	8	6	6 Acu, few Ci; light haze.

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent U. S. Naval Observatory. Data furnished by the U. S. Naval Observatory in cooperation with Harvard and Mount Wilson Observatories. The difference in longitude is measured from the central meridian, positive west. The north latitude is positive. Areas are corrected for foreshortening and are expressed in millionths of the sun's visible hemisphere. The total area for each day includes spots and groups]

Date	East-ern stand-ard time	Heliographic			Area		Total area for each day	Observatory
		Diff. in longi-tude	Longi-tude	Lati-tude	Spot	Group		
1936								
May 1	11 5	-69.5	149.7	+12.0	31		186	U. S. Naval.
		-44.0	175.2	-19.0		62		
		-14.5	204.7	+17.0		62		
		-8.0	211.2	+21.5	31			
May 2	11 19	-67.5	148.3	+12.5		46		Do.
		-30.0	175.8	-20.0		62		
		-26.5	179.3	-16.0	8			
		+2.0	207.8	+17.0		46		
		+5.0	210.8	+21.5		31	193	
May 4	13 23	-70.0	108.3	+12.5	15			Do.
		-55.0	123.3	+13.0		31		
		-2.0	176.3	-20.0		31		
		+28.0	206.3	+19.0	15			
		+30.0	208.3	+21.5	23			
		+42.5	220.8	+15.5		31	146	
May 5	11 14	-42.0	124.2	+12.0		77		Do.
		+10.5	176.7	-19.0		46		
		+41.0	207.2	+21.0		62		
		+42.0	208.2	+17.0		46	231	
May 6	13 38	-26.0	125.7	+13.0		62		Do.
		-13.0	138.7	+12.0		46		
		-8.0	143.7	-21.5	31			
		+26.0	177.7	-19.5		31		
		+66.0	207.7	+18.0	15		185	
May 7	11 14	-83.0	56.8	-26.0		62		Do.
		-13.0	126.8	+14.0		31		
		-2.0	137.8	+13.0		62	155	
May 8	11 6	-68.0	58.6	-25.0		216		Do.
		-1.0	125.6	+16.0		77		
		+6.0	132.6	+14.5		15		
		+11.5	138.1	+14.0		185	493	
May 9	11 36	-55.0	58.1	-25.0		247		Do.
		+12.0	125.1	+15.5		93		
		+23.5	136.6	+16.0		31		
		+28.0	141.1	+13.0		77	448	
May 10	12 00	-81.0	18.7	-28.0	252			Mount Wilson.
		-75.0	24.7	-18.0	7			
		-40.0	59.7	-25.0		367		
		-7.0	92.7	-27.5	3			
		+28.0	127.7	+14.0	5			
		+42.0	141.7	+13.0		49	683	
May 11	13 10	-74.0	11.8	-29.0		494		U. S. Naval.
		-28.0	57.8	-26.0		309		
		+50.0	135.8	+15.0	31			
		+55.0	140.8	+12.0	62		898	
May 12	10 59	-62.0	11.8	-28.0		586		Do.
		-16.0	57.8	-26.0		432	1,018	
May 13	11 33	-49.0	11.3	-28.0		586		Do.
		-4.0	56.3	-25.5		370	956	
May 14	11 12	-36.0	11.2	-28.0		586		Do.
		+7.5	54.7	-27.0	23			
		+12.0	59.2	-24.5		185		
		+22.0	69.2	-25.0	31		825	
May 15	11 12	-23.0	11.0	-28.0		741		Do.
		+28.0	60.0	-24.0		185		
		+35.5	69.5	-25.0	15		941	
May 16	11 10	-60.0	320.8	+19.0		62		Do.
		-10.0	10.8	-28.0		648		
		+31.0	51.8	-29.0	15			
		+39.0	59.8	-24.0		123		
		+44.0	64.8	+21.0		62		
		+49.0	69.8	-24.0	23		935	

POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	East-ern stand-ard time	Heliographic			Area		Total area for each day	Observatory
		Diff. in longi-tude	Longi-tude	Lati-tude	Spot	Group		
1936								
May 17	11 15	-82.0	285.5	+21.0		5		Mount Wilson.
		-47.0	320.5	+18.5		28		
		+3.0	10.5	-27.0		508		
		+52.0	59.5	-24.0		24		
		+61.0	68.5	+21.0		23		
		+81.0	68.5	-25.0		3	591	
May 18	11 7	-35.5	318.9	+19.0		77		U. S. Naval.
		+15.5	9.9	-28.0		403	540	
May 19	13 46	-19.5	320.2	+19.0		46		Do.
		+28.0	7.7	-28.0		401	447	
May 20	11 15	-7.0	320.8	+19.0	15		309	Do.
		+41.0	8.8	-28.0				
		+43.0	10.8	-24.0	15		339	
May 21	11 20	-70.0	244.6	-29.0	15			Do.
		-12.0	302.6	-17.0		46		
		+48.0	2.6	-28.5	31			
		+58.0	13.6	-27.0	185		277	
May 22	11 10	+2.0	303.4	-16.5		123		Do.
		+48.0	349.4	-7.0		77		
		+60.0	1.4	-28.0	15			
		+72.0	13.4	-27.0	123		338	
May 23	11 30	-75.0	213.0	-21.0	23			Do.
		-64.0	224.0	-22.0	23			
		-22.0	286.0	+36.5		62		
		+14.0	302.0	17.0		93		
		+62.0	350.0	-7.0		93	294	
May 24	9 00	-80.0	196.2	-16.0	114			Mount Wilson.
		-67.0	209.2	+15.0		31		
		-60.0	216.2	-20.0		9		
		-52.0	224.2	-24.0		32		
		-41.0	235.2	+17.0		3		
		-30.0	246.2	-29.0		5		
		-11.0	265.2	+36.0		14		
		+24.0	300.2	+10.0		125		
		+28.0	302.2	-15.0		30		
		+78.0	354.2	-7.0	18		382	
May 25	10 53	-64.0	197.0	-17.0		154		U. S. Naval.
		-40.0	221.0	-23.0		185		
		-38.0	225.0	-21.5		31		
		+3.0	264.0	+37.0		123		
		+38.0	299.0	+11.0		278		
		+41.0	302.0	-18.5		108	879	
May 26	14 6	-46.0	200.0	-16.0		185		Do.
		-24.0	222.0	-22.0		139		
		+21.0	267.0	+36.0	23		247	
		+54.0	300.0	+11.0		93	687	
May 27	11 31	+57.0	303.0	-16.0		93		Do.
		-33.0	202.1	-16.0		185		
		-12.0	223.1	-23.0		108		
		+9.0	244.1	-19.0		93		
May 28	12 9	+66.0	301.1	+11.0		216		Do.
		-76.0	145.5	-18.0		123	602	
		-19.0	202.5	-16.0		185		
		-1.0	220.5	-25.0		62		
		+24.0	245.5	-17.5		93		
		+53.0	274.5	+21.0	31			
May 29	12 10	+78.0	297.5	+11.0		123	617	
		-66.0	142.3	17.0		247		
		-6.0	202.3	-16.0		154		
		+30.0	238.3	+13.0		15		
		+34.0	242.3	-21.0		62		
		+65.0	273.3	+20.0		31	509	
May 30	12 42	-52.0	142.7	-17.0		247		Do.
		+8.0	202.7	-16.0		216	463	
May 31	13 29	-38.0	143.1	-18.0		278		Do.
		+21.0	202.1	-16.0		216		
		+51.0	232.1					